

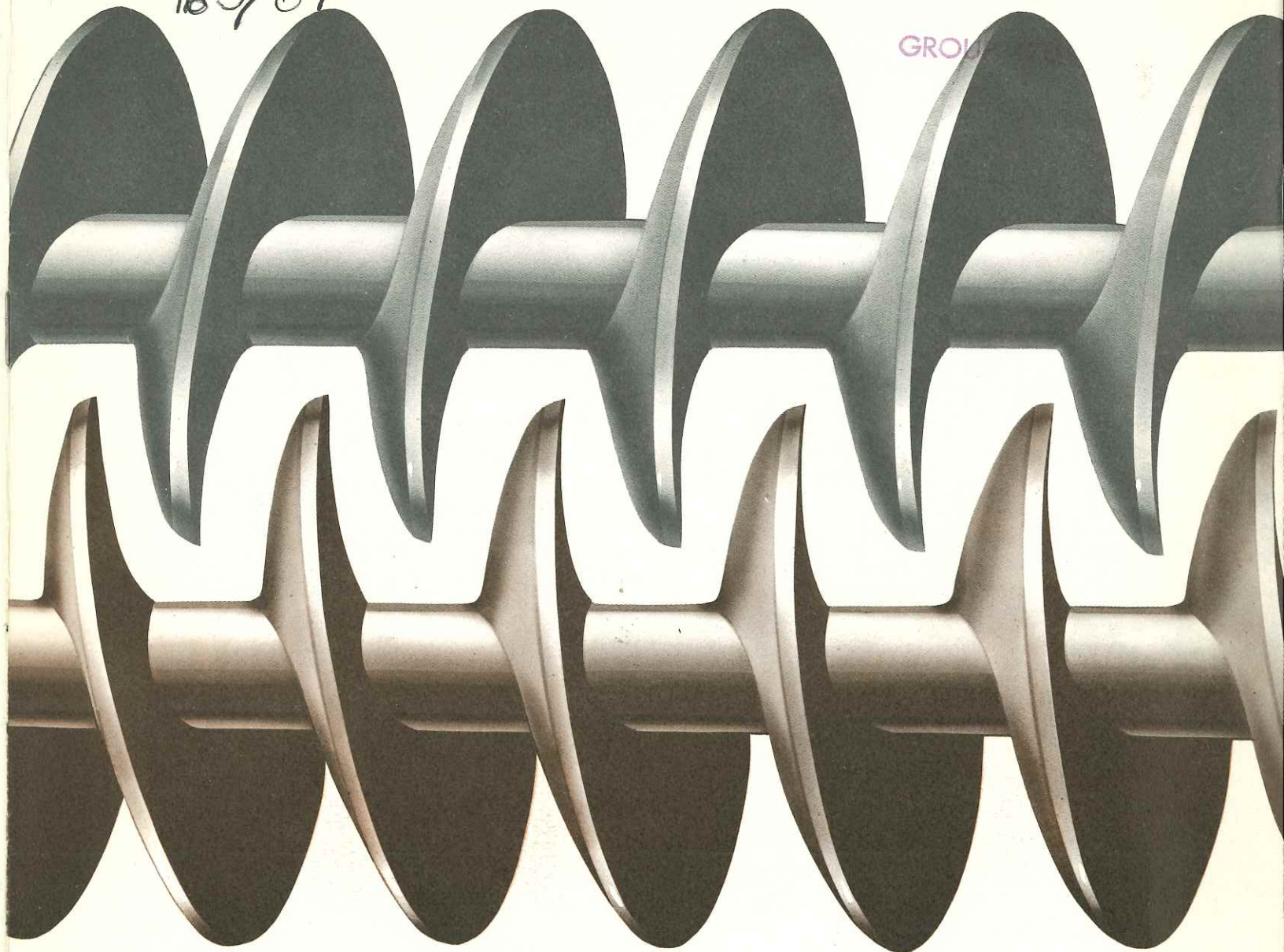
~~SECRET~~

165/87

RECEIVED

OCT 28 1968

GROUP 170



# HOLO-FLITE<sup>®</sup>

## PROCESSOR

**WESTERN PRECIPITATION'S  
SUPERIOR HEAT EXCHANGER**

...PROVEN FOR COOLING,  
HEATING, COOKING, DRY-  
ING & SOLVENT RECOVERY

RECEIVED

OCT 28 1968

GROUP 170

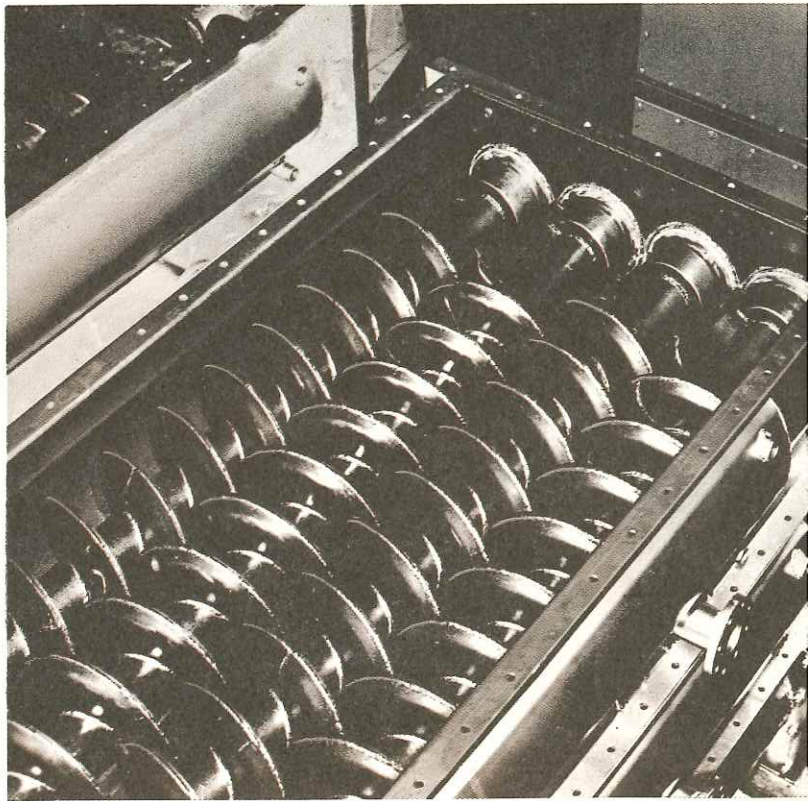
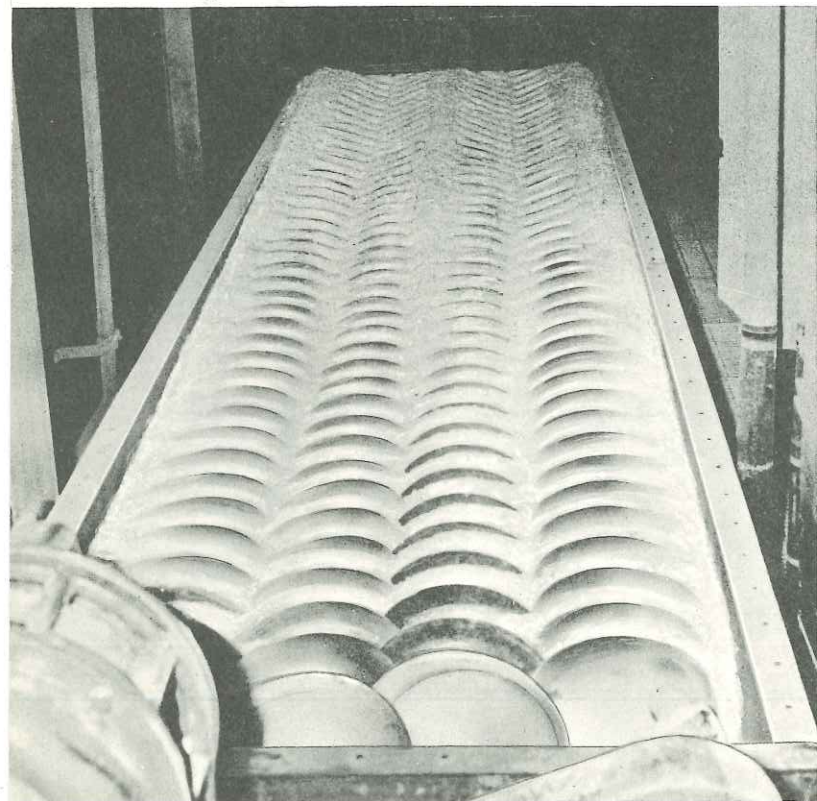


The HOLO-FLITE Processor is an *indirect* heat exchanger. Heat is transferred to or from the heat exchange agent through the surfaces of the hollow flights and shaft. And — since the principle of the conveyor is employed — the particles of the material within the mass are subjected to continuous movement by the helices and are constantly changing location. This causes them, as they move through the

# THE HOLO-FLITE<sup>®</sup> PROCESSOR

trough, to come into frequent and repeated contact with the surface containing the heat exchange agent. The slow, rotating, conveying, interfolding and dispersing action has the added advantage that the motion is so mild and gentle that there is no dusting nor particle degradation.

**APPLICATIONS** — The HOLO-FLITE is widely used for cooling, heating, drying and for other operations where heat transfer is involved. Heat transfer agents such as glycol, brine, water, steam or hot oil provide a wide range of processing temperatures.



*Typical HOLO-FLITE Processor units (left) filled with material and (right) showing quadruple Synchro-Screws.*



Since an assembly may be arranged in tiers, the heat exchange agent for heat-sensitive products can be introduced into each tier individually at the desired temperature. In this way shock treatment can be controlled and undesired chemical reactions avoided. In a continuous operation, by using the proper temperature in each tier, the product can be progressively heated or cooled to meet specific requirements.

Among the many applications for the HOLO-FLITE Processor are the following:

**COOLING** . . . Mineral products such as fluorspar, iron oxide, gypsum, bauxite, cryolite and the high-temperature calcines.

. . . Chemical products such as flake caustic, phosphate, soda ash, coke char, carbon, plastics, silicates, etc.

. . . Food products such as salt, sugar, flour, cake mix, pie fillings, ground meat, etc.

. . . Meal cakes such as cotton seed, flax seed, soy bean, etc.

**HEATING** . . . Pre-heating ahead of processing or drying operations.

. . . Temperature control between processing steps.

. . . Sterilization of food products.

**DRYING AND CALCINING** . . . Water removed from slurries, sludges and filter cakes.

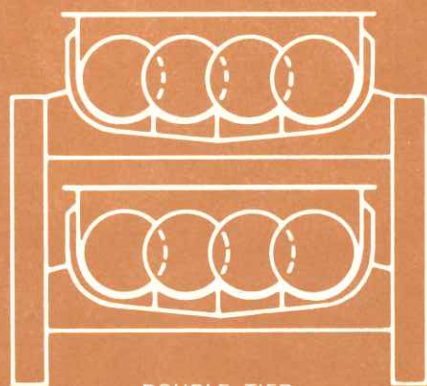
. . . Calcining of gypsum.

. . . Vacuum drying of heat-sensitive products.

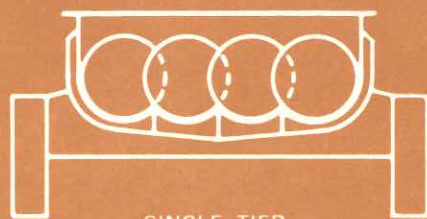
**SOLVENT RECOVERY** . . . Solvent removal from polyethylene, polypropylene, rice bran, soy bean meal and chemicals.

**MINIMUM SPACE REQUIRED** — The compact design of the HOLO-FLITE Processor not only requires the minimum space per se; but because a number of tiers can be stacked vertically, ground or floor space can be saved. *Probably no other heat exchanger requires as little space — in some cases the saving in space has been from six to fifteen times over other types of equipment.*

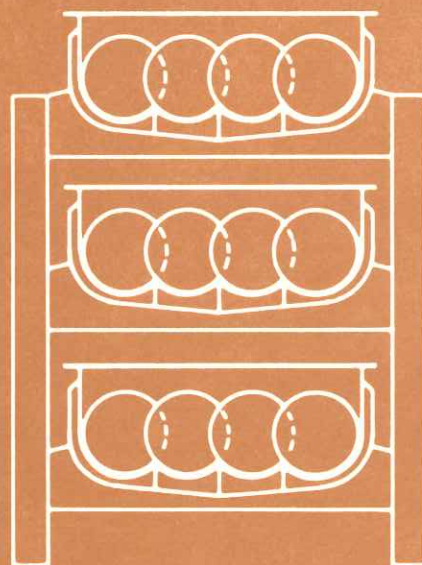
**ECONOMY WITH EFFICIENCY** — The HOLO-FLITE heat transfer areas are completely covered with the material processed, and therefore the thermal efficiency is the highest possible to attain.



DOUBLE TIER



SINGLE TIER



TRIPLE TIER

*Typical vertical tier arrangements. Other tier, as well as other screw arrangements, are available as required.*



# CONSTRUCTION AND OPERATION

Although the HOLO-FLITE Processor can be furnished with a single screw, the standard construction for most applications consists of two or four hollow helical screws known as "Synchro-Screws." (See the previous page.) The assembly of the trough and screws — with suitable bearings, synchronizing gear, heat transfer agent connections and material inlet and outlet ports — constitutes a tier. The overall length of a tier ranges from 13 to 27 feet. The dimensional details for usual sizes are given on the last page.

According to the requirements of a particular application, a HOLO-FLITE Processor may consist of one or more tiers. The tiers may be placed one above the other (See the previous page.) or, when necessary, may be strung out horizontally as a conveyor system.

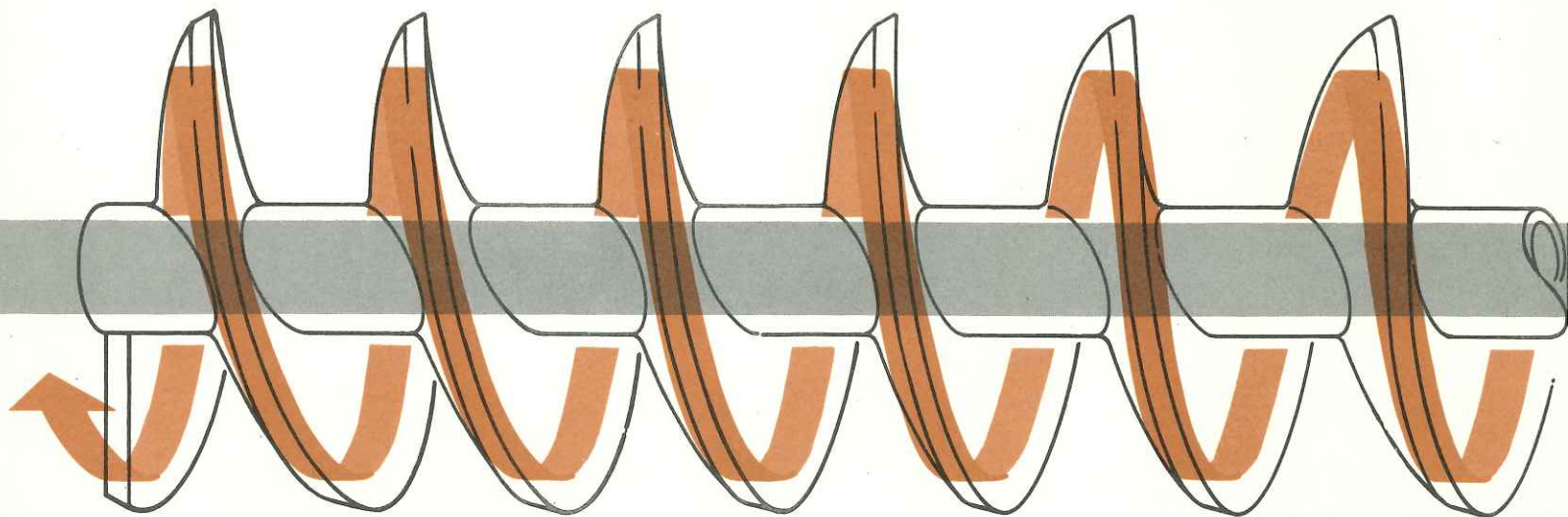
The Synchro-Screws are built in four diameters ranging from seven to twenty-four inches of various metals — steel, stainless steel, monel and other alloys.

Synchro-Screws are available to handle internal operating pressures up to 250 psig.

**THE SYNCHRO-SCREWS** — The hollow Synchro-Screws are nested and intermeshed as twins, quads, etc., according to heat transfer area requirements, tonnage, space limitations and time of retention. They are alternately right and left hand and rotate counter-directionally. The intermeshing multiple screw design permits the inclusion of the maximum amount of active heat transfer area per unit of length of trough. The intermeshing of the screws insures a fluidized particle motion throughout the processed mass that insures uniform and complete processing of the material.

The particle size and requirements as to degradation govern the pitch of the flights, and replacement of screws with others of different pitch can be made to change heat exchange area.

Each screw is equipped with a rotary union at one end to introduce and remove the heat exchange agent and is designed for specific operating requirements.



Heart of the HOLO-FLITE System is the basic Synchro-Screw operation, shown schematically above. The heat exchange agent first moves through the hollow shaft of the unit, down the entire length of the assembly. It then turns into the helical outer portion of the

unit, returning through the series of hollow flights to the starting point. Thus, the continuous spiral conveyor action combines with the heating or cooling effect of the agent within the conveyor itself. Two or four such units, intermeshing, are normally used.



In most cases the HOLO-FLITE Processor operates at a predetermined screw speed between 1 and 20 rpm.

**TROUGHS** — The trough is built to suit the diameter, length, and number of Synchro-Screws. It is constructed of metals to match the Synchro-Screws specifications — or a combination of metals, such as stainless steel where the processed material is contacted, and ordinary steel for other parts. It can be furnished with open top or with cover — with or without jacket body and/or jacketed cover — and for vacuum or pressure operation, in which case the cover and trough are made as one integral cylindrically shaped construction. (See "Special Applications," No. 2.)

Troughs can be furnished with drop bottom.

The trough covers are either flat or the vapor dome type, as required. They may be clip-fastened or of bolted and gasketed construction.

When troughs are jacketed, the standard design is for

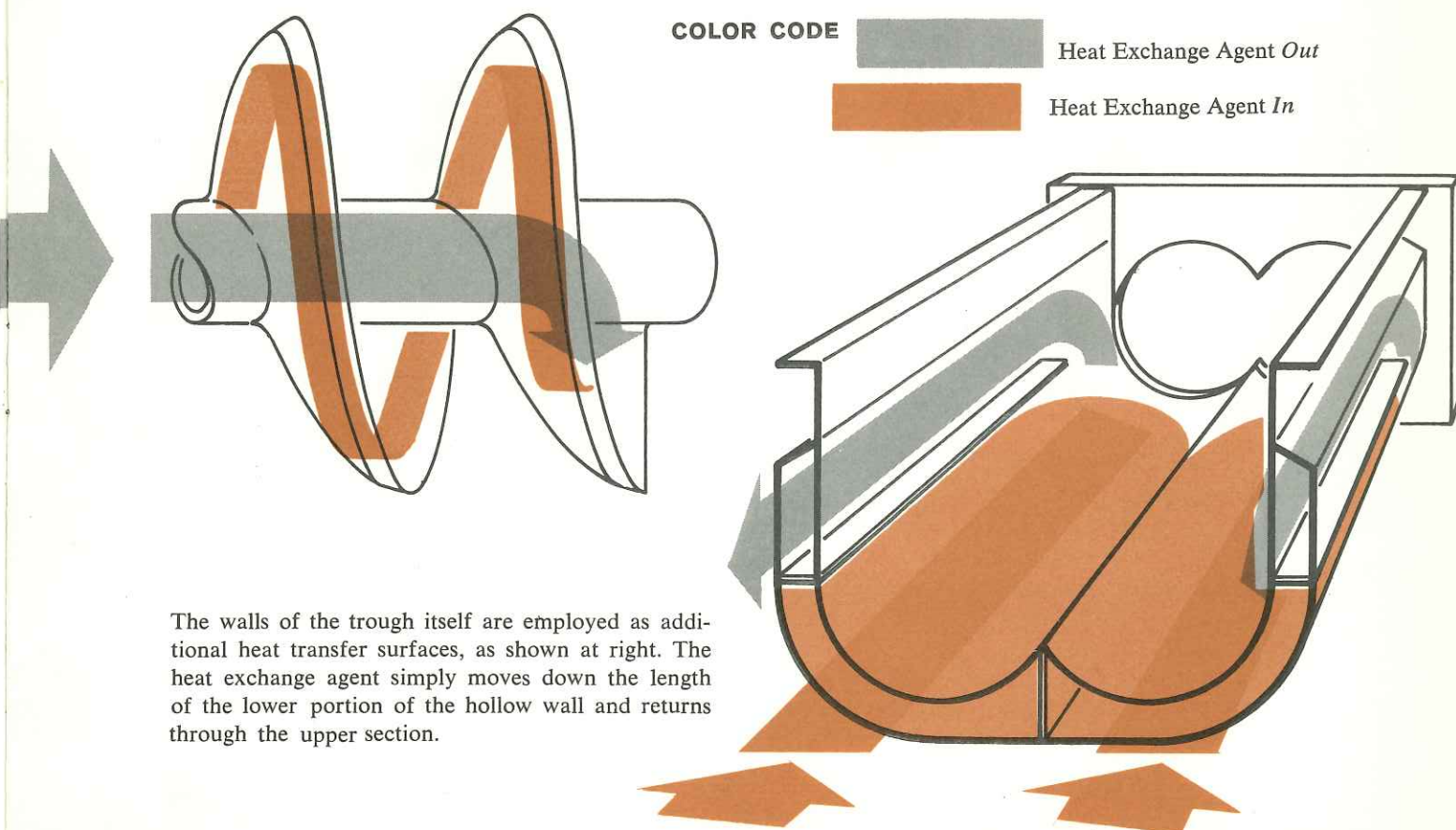
15 psig, but designs for higher pressures can be supplied to order.

**HEAT EXCHANGE AGENT** — Each Synchro-Screw has an independent connection for the heat exchange agent. In a stack comprising several tiers, the drive gears for all tiers are on one end of the stack and the heat exchange connections are all at the opposite end. However, the connections can be arranged for a parallel flow or counter flow for each tier, regardless of the direction in which the material mass is moving.

**DRIVE** — The design of the drive will vary according to the requirements, and a variety of drive arrangements is available to suit the application and the screw speed.

**FOR HAZARDOUS AREAS** — A special design can be furnished for operation in hazardous areas.

The ASME Code Stamp is furnished when required.

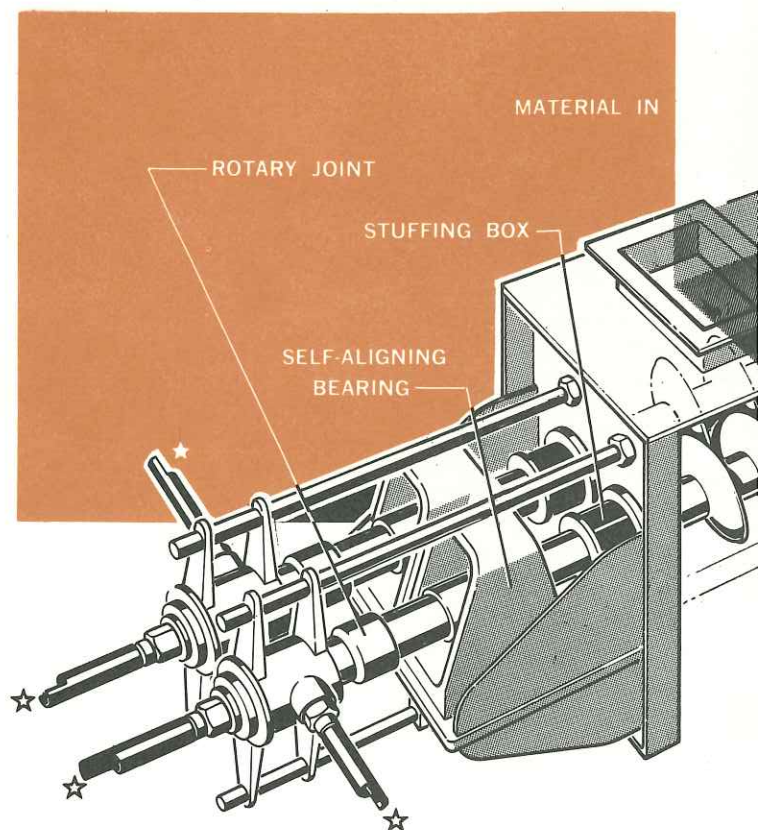




# THE OVERALL PICTURE

Operation of a complete HOLO-FLITE assembly is seen in the partial cutaway view shown here. Material being processed is introduced at the near end and moved by the rotating screw conveyor by the outlet at the far end. At the same time, it is either heated, cooled, or otherwise treated by a suitable heat transfer agent, which is in continuous movement through the hollow walls and, especially, the Synchro-Screws. This diagram serves to emphasize the combined, continuous action which is the secret of the HOLO-FLITE's outstanding combination of maximum economy with the highest possible efficiency.

Other features of a typical double-screw HOLO-FLITE tier assembly are shown on the diagram. Of special interest are the rotary joints, with their heat exchange agent connections. Single and quadruple-screw units are similar in construction and operation.



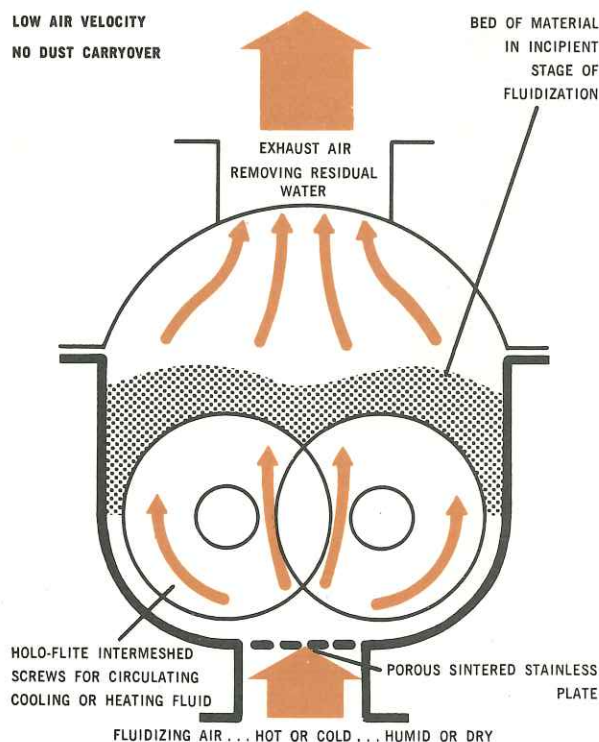
## SPECIAL APPLICATIONS

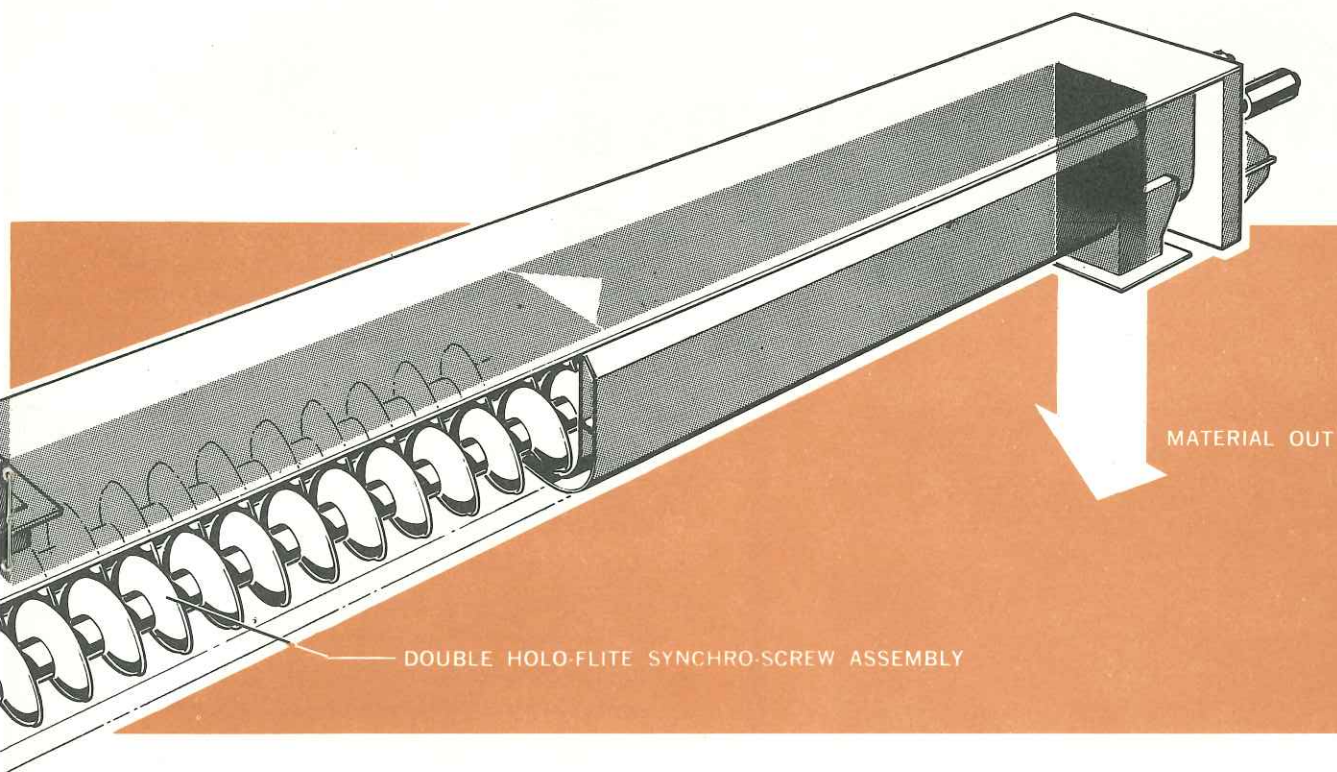
### NO. 1 THE FLUIDIZED BED

The principle of the fluidized bed has been utilized in many industrial applications, but since the air is normally used as the heating or cooling agent, high volumes are required, demanding dust collectors and large fans.

In the Fluidized Bed HOLO-FLITE, on the other hand, the air (or inert gas) is used only as a fluidization agent, resulting in extremely low gas requirements and no dust problems whatsoever.

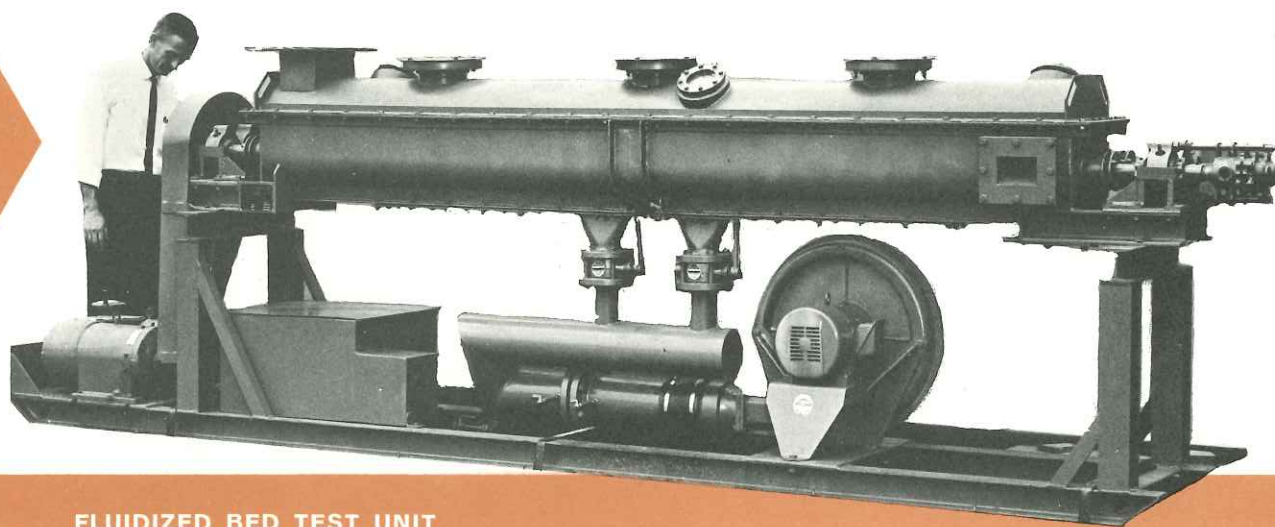
The cross-section shown here illustrates all of the main features of the Fluidized Bed HOLO-FLITE. Air is introduced at the bottom of the bed and moves upward through the product, fluidizing it. Heat transfer is greatly improved due to the gentle agitation against the many surfaces of the HOLO-FLITE.





DOUBLE HOLO-FLITE SYNCHRO-SCREW ASSEMBLY

★ HEAT TRANSFER AGENT CONNECTIONS



FLUIDIZED BED TEST UNIT

A Fluidized Bed HOLO-FLITE test unit is available for plant studies; however, normally it is unnecessary, sufficient information being available to properly size most commercial installations. Shown above is a typical twin-screw unit with blower mounted below.



# SPECIAL APPLICATIONS

## NO. 2 HIGH PRESSURE TROUGH

Since the standard HOLO-FLITE is designed to operate at atmospheric pressure, a special integral trough-cover assembly has been developed for those cases requiring high pressure or vacuum operation. The principal features of this unit are shown in the cross-section diagram below.



# FEATURES AND

The features of design, construction and installation of the HOLO-FLITE Processor offer many important advantages where heat transference is required. These include:

### ADAPTABILITY TO PROCESS:

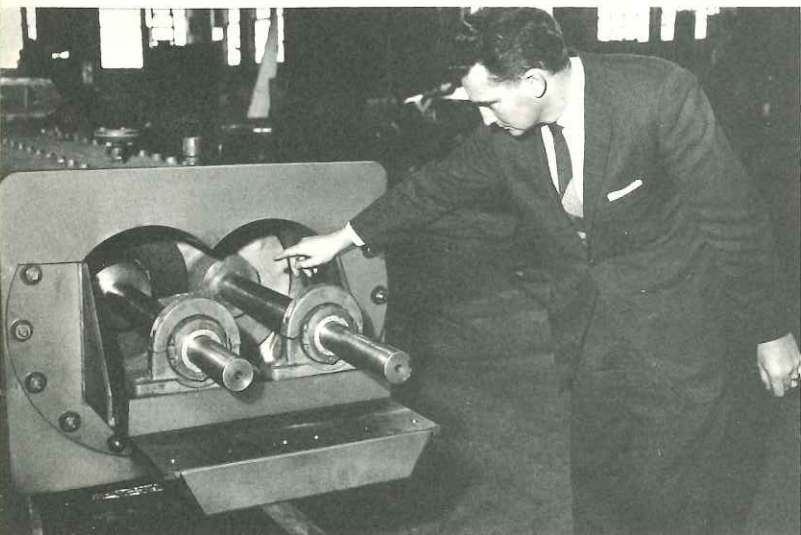
1. Close control of material as to temperature and time of treatment.
2. Control of quantity of heat exchange agent.
3. Individual control of temperature of heat exchange agent in each screw or tier.
4. One or all of the functions of heating, drying and cooling to be done continuously in the same unit.
5. On heat-sensitive products, the heat exchange agent can be introduced into each tier individually at the desired temperature.
6. Heat transfer agent may be circulated either parallel or counter current to the flow of the material.
7. Compact design is ideal for vacuum processing.
8. Inert gas atmospheres readily maintained in material compartment.
9. Sticky materials can be handled due to positive conveying action of Synchro-Screws.

### ADAPTABILITY TO LAYOUT:

1. Four standard screw sizes and one to four screws per trough.
2. Trough lengths 10 to 20 feet.
3. Multi-tiering in a unit or horizontal string-out as a conveyor system.
4. Variety of drive combinations to meet individual requirements.
5. Can be operated on an incline to 15° up.

### ADAPTABILITY TO PRODUCTION CHANGES:

1. Standard design makes addition of more tiers easy at a later date.
2. Screw speed can be readily changed to increase or decrease conveyor capacity.
3. Temperature of coolant can be lowered or steam pressure can be increased for production ease.



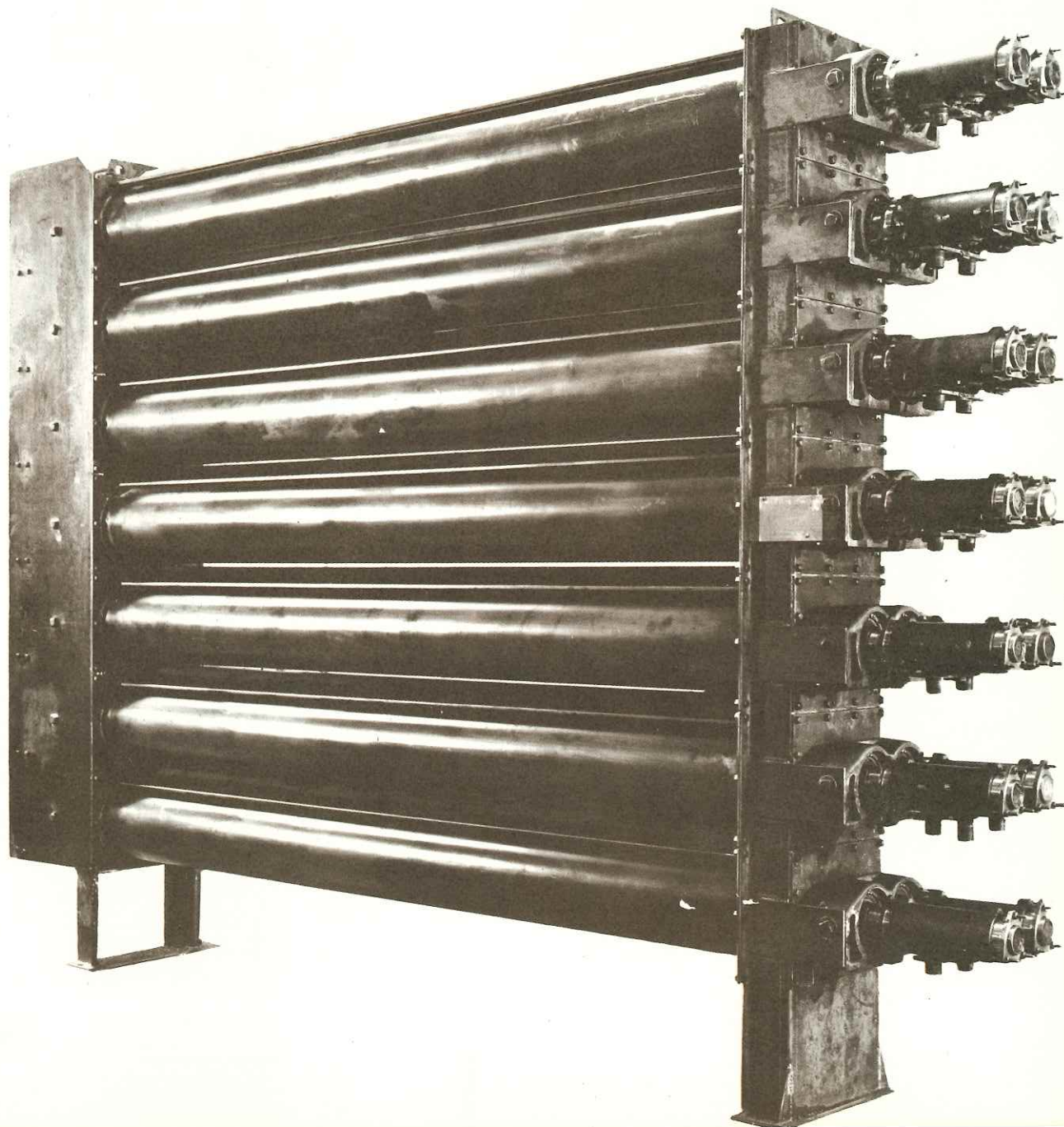
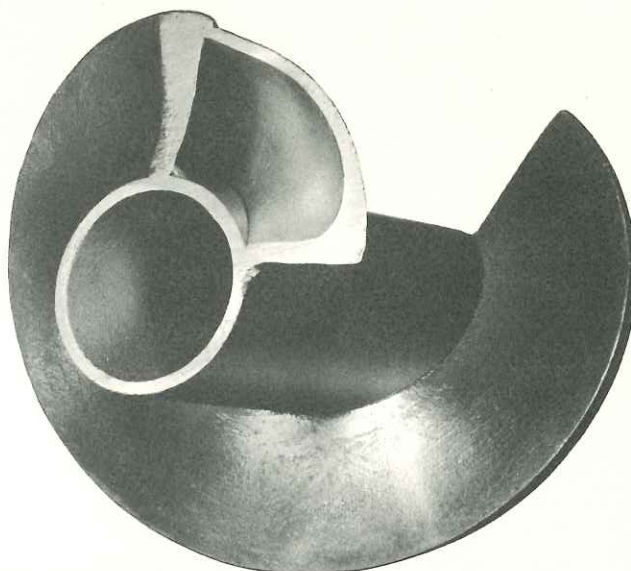
*Integral trough-cover assembly is an example of adaptation of basic HOLO-FLITE design to special needs.*



# ADVANTAGES

*The cutaway section of an actual HOLO-FLITE screw at right shows the rugged combination of welded flights and shaft, resulting in an integral helical conveyor-heat transfer surface. Unique, exclusive design features makes the HOLO-FLITE outstanding in the processor field.*

*Below can be seen a typical example of a vertically stacked group of double-screw tiers, illustrating the HOLO-FLITE's small floor space requirement.*





# GENERAL DESIGN SPECIFICATIONS

### SCREWS

Internal operating pressures up to 250 psig.

### ROTARY UNIONS

Each screw is equipped with rotary union at one end to introduce and remove heat exchange agent.

### DRIVE

A variety of drive arrangements to suit application — generally V-belt drive from motor to speed reducer, chain-and-sprocket from gear reducer to HOLO-FLITE.

Most HOLO-FLITE Processors operate with a screw between 1 and 20 rpm.

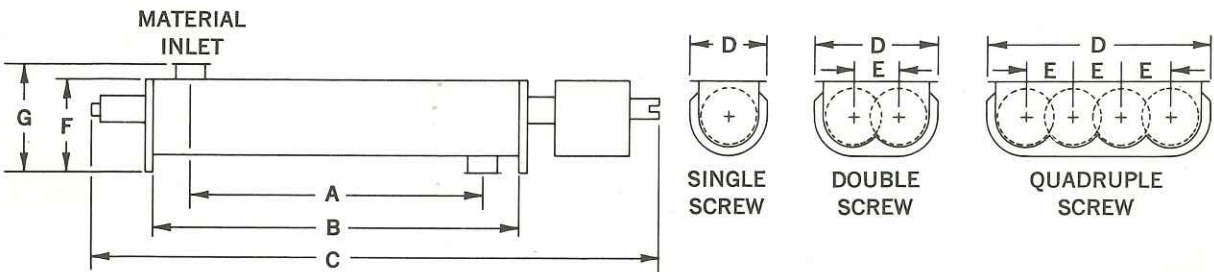
### TROUGHS

Plain “U” or contour type. Trough ends are equipped with shaft seals to fit operating conditions.

### TROUGH JACKETS

Standard design for 15 psig. Higher pressures available as required.

## APPROXIMATE DIMENSIONS



### UNIT SIZE AND TYPE DESIGNATION

Each Holo-Flite Processor is designated by a group of numbers and letters, arranged to specifically identify the unit as indicated in the following example:

HOLO-FLITE TYPE	1	D	12	14-6	
NOTE:					
S = SINGLE					
D = DOUBLE					
Q = QUADRUPLE					
					PITCH OF THE SCREWS .....INCHES
					NOMINAL LENGTH OF SCREWS .....FEET
					NOMINAL DIAMETER OF SCREWS .....INCHES
					NUMBER OF SCREWS IN TIER.....(SEE NOTE)
					TOTAL NUMBER OF COMPLETE TIERS IN THE UNIT



## TROUGH COVERS

Flat or vapor dome type as required. Clip fastening or bolted-gasketed construction. Also integral with trough for vacuum or pressure applications.

## MATERIAL COMPARTMENT

Standard design for operation at atmospheric pressure. Special design for pressures up to 100 psig, and for full vacuum.

## MATERIALS OF CONSTRUCTION

The HOLO-FLITE is of welded construction and can be

built of any material amenable to welding with suitable strength characteristics for parts contacting material or vapors.

## CODE CONSTRUCTION

ASME Code Stamp is furnished when required.

## HAZARDOUS AREAS

Special designs can be provided for operation in hazardous areas.

### UNIT SIZE

	A	B	C*	D	E	F	G	H**	SCREW SERIES
1S710	8'10"	10'0"	13'1"	13"	—	17"	20"	26"	DIAMETER <b>7</b> INCHES
1S712	10'10"	12'0"	15'1"	13"	—	17"	20"	26"	
1S714	12'10"	14'0"	17'1"	13"	—	17"	20"	26"	
1D710	8'10"	10'0"	13'7"	20"	6"	17"	20"	26"	
1D712	10'10"	12'0"	15'7"	20"	6"	17"	20"	26"	
1D714	12'10"	14'0"	17'7"	20"	6"	17"	20"	26"	
1S1210	8'7"	10'0"	14'1"	19"	—	23"	26"	37"	DIAMETER <b>12</b> INCHES
1S1212	10'7"	12'0"	16'1"	19"	—	23"	26"	37"	
1S1214	12'7"	14'0"	18'1"	19"	—	23"	26"	37"	
1S1216	14'7"	16'0"	20'1"	19"	—	23"	26"	37"	
1D1210	8'7"	10'0"	15'5"	29"	10"	23"	26"	37"	
1D1212	10'7"	12'0"	17'5"	29"	10"	23"	26"	37"	
1D1214	12'7"	14'0"	19'5"	29"	10"	23"	26"	37"	
1D1216	14'7"	16'0"	21'5"	29"	10"	23"	26"	37"	
1S1612	10'4"	12'0"	16'3"	23"	—	27"	30"	45"	DIAMETER <b>16</b> INCHES
1S1614	12'4"	14'0"	18'3"	23"	—	27"	30"	45"	
1S1616	14'4"	16'0"	20'3"	23"	—	27"	30"	45"	
1S1620	18'4"	20'0"	24'3"	23"	—	27"	30"	45"	
1D1612	10'4"	12'0"	17'5"	35"	12"	27"	30"	45"	
1D1614	12'4"	14'0"	19'5"	35"	12"	27"	30"	45"	
1D1616	14'4"	16'0"	21'5"	35"	12"	27"	30"	45"	
1D1620	18'4"	20'0"	25'5"	35"	12"	27"	30"	45"	
1Q1612	10'4"	12'0"	17'5"	59"	12"	28"	31"	46"	
1Q1614	12'4"	14'0"	19'5"	59"	12"	28"	31"	46"	
1Q1616	14'4"	16'0"	21'5"	59"	12"	28"	31"	46"	
1Q1620	18'4"	20'0"	25'5"	59"	12"	28"	31"	46"	
1S2412	10'9"	12'0"	16'10"	30"	—	33"	35"	58"	DIAMETER <b>24</b> INCHES
1S2414	12'9"	14'0"	18'10"	30"	—	33"	35"	58"	
1S2416	14'9"	16'0"	20'10"	30"	—	33"	35"	58"	
1S2420	18'9"	20'0"	24'10"	30"	—	33"	35"	58"	
1D2412	10'9"	12'0"	18'3"	48"	18"	33"	35"	58"	
1D2414	12'9"	14'0"	20'3"	48"	18"	33"	35"	58"	
1D2416	14'9"	16'0"	22'3"	48"	18"	33"	35"	58"	
1D2420	18'9"	20'0"	26'3"	48"	18"	33"	35"	58"	
1Q2412	10'9"	12'0"	18'3"	84"	18"	33"	35"	58"	
1Q2414	12'9"	14'0"	20'3"	84"	18"	33"	35"	58"	
1Q2416	14'9"	16'0"	22'3"	84"	18"	33"	35"	58"	
1Q2420	18'9"	20'0"	26'3"	84"	18"	33"	35"	58"	

\*DRIVE NOT INCLUDED

\*\*STANDARD CENTERING DISTANCE BETWEEN TIERS





RECEIVED

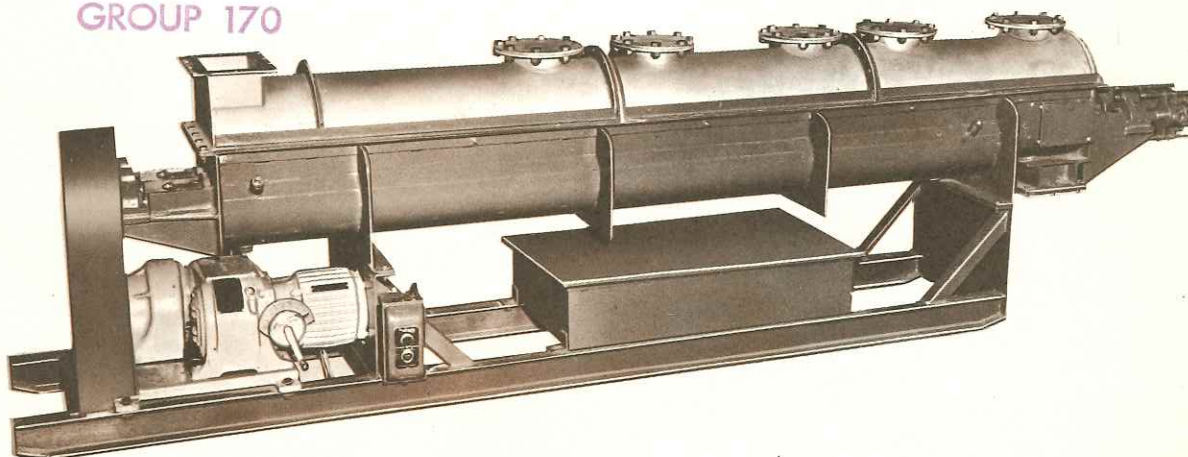
OCT 28 1968

GROUP 170

## FOR PILOT PLANT AND RESEARCH STUDIES

Western Precipitation has available, on a loan-  
rental basis, package units of either single HOLO-FLITE  
Processors or a combination of HOLO-FLITE with a direct-  
fired heater when hot oils are required.

**THE HOLO-FLITE** unit has a variable speed drive with  
connection for 220 volt or 440 volt AC current. Requires  
no supports or foundation. This pilot unit can operate at  
screw pressures up to 150 psig and at temperatures ranging  
from  $-20^{\circ}\text{F}$  to  $650^{\circ}\text{F}$ .



## FOR SAMPLE TESTING AT OUR TEST CENTER...

Western Precipitation has recently established a modern Test Center in Los Angeles where your product can be tested at a nominal charge. Heating, Cooling, Drying, Cooking or Solvent Recovery tests can be made quickly and accurately under the supervision of specialists from your samples.

Heat transfer oil up to  $600^{\circ}\text{F}$  and steam up to  $340^{\circ}\text{F}$  is available for all ranges of tests.

**THE HOLO-FLITE** processor is a new method for heat transfer that could mean vast improvement in your heat transfer efficiencies. The HOLO-FLITE test center permits you to try this method at low cost to prove its value before any capital investment is made.

Call or write any Western Precipitation office for details.



MADE ONLY BY  
**WESTERN PRECIPITATION**  
GROUP  
**JOY MANUFACTURING CO.**

Represented by:

LOS ANGELES: 1000 W. 9th Street, MADison 7-4771  
PITTSBURGH: Oliver Building, GRant 1-2116  
NEW YORK: 757 Third Ave., TEmpleton 8-2924  
CHICAGO: 4421 Harrison St., Hillside, Ill. 547-6700  
MONTREAL: 8285 Mountain Sights Ave., REgent 9-2781  
LONDON: No. 7 Harley Street, Langham 7711  
AUSTRALIA: Joy Manufacturing Co., Pty. Ltd.  
78 Kent Road Mascot, N.S.W. 67-5161  
JOHANNESBURG: Joy Manufacturing Co., (Africa) (Pty) Ltd.  
1, Steele Street., Steeledale 869-1461

Representatives in all principal cities